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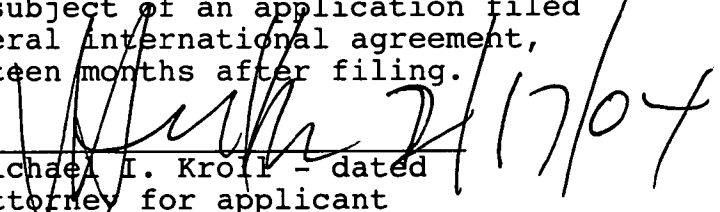
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Michael I. Kroll - dated
Attorney for applicant
Registration s/n: 26,755

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Re: US Utility Patent Application
Title: Automated Apparatus and System for Cooking,
Drying and Peeling Shellfish Products
Inventor: **Michael J. Hulin**
Filing/Patent pending date: 17 February 2004
Attorney docket no.: MH-2-am-mv

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FOR

Automated Apparatus and System for Cooking, Drying and
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Hulin, Atty. Doc. No. MH-2-am-mv; 22 Jan 2004

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to shrimp processing and, more specifically, to a method and apparatus for boiling, drying, peeling and size grading shellfish products such as shrimp and crawfish while simultaneously utilizing the by-products to process broth and salt. The present invention includes a fully automated means for processing shrimp, broth, salt, food additives, animal feed and fertilizer and moving the product from the loading dock to a finished product storage area without the need of human contact with the product thereby greatly reducing the risk of contamination and the cost of labor.

The procedures currently being used for processing shrimp require having personnel and employees manually dump the product into a conk tank and transfer it from one processing system into the next thereby exposing the food product to sweat, saliva, respiratory germs and the like. Furthermore, airborne

contaminants also come in contact with the food product during processing, increasing the risk of causing sickness and disease to the consumer.

Furthermore, airborne contaminants also come in contact with the personnel during processing thereby increasing the risk of respiratory disease associated with the inhalation of sodium bisulphate and other harmful airborne contaminants.

The present invention seeks to alleviate these inherent dangers by eliminating the need for workers to come in contact with the product and providing a plurality of vacuums and cleaning systems to ensure a clean environment during processing. Automated conveyors serve to move the product from one system to the next from the loading dock to the storage tank. Each system involved in the processing is independent from the others and the conveyors are not attached thereby allowing a facility to upgrade current equipment to the completely automated system in steps.

Description of the Prior Art

There are other shellfish processing means known in the art. While these shrimp processors may be suitable for the purposes for which they were designed, they would not be as suitable for the purposes of the present invention, as hereinafter described.

SUMMARY OF THE PRESENT INVENTION

A primary object of the present invention is to provide a method and apparatus for processing shellfish that will add automation to the current process.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that greatly reduces heat within the work area.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the contamination of product during the current drying system due to condensation which accumulates on ceiling and then drops onto product.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the exposure to excessive perspiration from employees, which currently falls directly onto product while loading, raking (rotating) and unloading.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates air contamination within the work area due to shrimp dust and possible preservatives such as sodium bisulphate that fishermen apply to raw product and that become airborne during the process.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the hands-on labor of loading and unloading raw product into the boiling system.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the hands-on labor of loading and unloading boiled seafood into dryers.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the hands-on labor of loading and unloading of dried product into the peeling device.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the hands-on labor of rotating the product every thirty minutes during the drying process.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the contamination transfer of shrimp dust from previous batches of product to subsequent batches of product.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the over-drying of smaller product and the under-drying of larger product while offering a perfectly dried product based on size.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the hands-on labor of hand picking debris from the finished product up to 66% above the present means.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that adds an additional smaller size of product, which is normally lost in the peeling process, thereby increasing the yield.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the breaking of the tips of the tails of the product, thereby having a great impact on the yield increase.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that offers a cleaner product without damaging the finished product thereby removing the legs, heads and shells while leaving the tails intact.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that adds an easy means of sanitizing between batches of product whereas the prior art has no sanitizing means whatsoever.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates the hands-on labor of sweeping up peelings and shrimp dust for shipment by packing the peelings and dust in 50-gallon drums.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that offers a more cost-effective and energy-efficient process of drying by utilizing residual heat from the boilers and broth system to heat the dryers.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that will reduce the cost of the product on the consumer end thereby making it a more desirable product.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that eliminates human contact therewith, thereby reducing the risk of contamination and the cost of labor.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein crates of iced shrimp are placed on a conveyor belt on the loading dock and transported to a tilt-dumping cage at the end thereof into which they are dropped so that the shrimp and ice fall into a conk tank and the crate is subsequently tossed aside by a removal bar to make room for the following crate thereby negating the need of manually dumping the product into the conk tank.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish including a conk tank filled with water wherein jetted water is used to separate conk shells and other heavy items which become trapped in the bottom of the tank while the lighter items which respond to the agitated water are moved to the transport system.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the conk tank includes a conveyor system to transport the product to a primary seafood boiler.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the primary seafood boiler cooks the product at a predetermined temperature for a selected amount of time while jetted air serves to stir it during the boiling process.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the primary seafood boiler is supplied and replenished with brine or salt water (water with salt added) that is mixed in a brine mixing tank and stored in auxiliary boilers to maintain the fresh brine at a specific temperature until such time that it is to be introduced into the primary seafood boiler.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish including a spray drying system wherein brine is extracted from the primary seafood boiler and injected into a heated furnace or hopper as a fine mist where it is almost immediately dehydrated thereby creating a solid product to be used as a seafood flavored salt or additive.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the product is transferred from the primary seafood boiler via a seafood dryer conveyor system where it is spread out and stirred by a plurality of spreader bars and rakes as it is cooled by high speed fans to terminate the cooking process in a thorough, uniform manner.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the product is transferred to dryers from the primary seafood boiler by a conveyor system rather than manually as is the current method used in the industry.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the product is dried in stacked dryers and rotated periodically at a predetermined rate to ensure even drying.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the product is

dried in spiral dryers that move the product in a spiral rotation to the top of the dryer where it is dumped through a chute back to the bottom and reloaded as the process is repeated.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that will vacuum dried product from the traditional box dryers into the peeling device described in this process.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that is to vacuum dried product from the traditional tumbler peelers previously being used. Which is one step for upgrading the old method to this new system.

Yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the dryers may be piggybacked with the product being transferred from one dryer to the next.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the product is transferred from the dryers to a peeling device that will de-shell the product while keeping the tails intact.

Another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish wherein the peeling device includes a spinning blade that causes the cleaned product to ride along the sides of an inner compartment which is smooth and allow the unclean product which is heavier and bulky to remain on the screen area.

Still another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that is simple and easy to use.

Still yet another object of the present invention is to provide a fully automated method and apparatus for processing shrimp and crawfish that is inexpensive to manufacture and operate.

Additional objects of the present invention will appear as the description proceeds.

The foregoing and other objects and advantages will appear from the description to follow. In the description reference is made to the accompanying drawings, which forms a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments will be described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural changes may be made without departing from the scope of the invention. In the accompanying drawings, like reference characters designate the same or similar parts throughout the several views.

The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is best defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

In order that the invention may be more fully understood, it will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a schematic diagram of the present invention;

FIGURE 2 is a diagrammatic view of the product from the loading dock to the primary seafood boiler;

FIGURE 3 is a block diagram of the boiler system;

FIGURE 4 is a block diagram of the heat exchange system;

FIGURE 5 is a block diagram of the present invention;

FIGURE 6 is a block diagram of the dryer and its related components;

FIGURE 7 is a front view of the peeling device and associated options;

FIGURE 8A - 8C is a block diagram showing the components and relationship for the seafood processing system;

FIGURE 9 is a block diagram of the brine broth processing system;

FIGURE 10A - 10B is a block diagram of the heat recovery system; and

FIGURE 11 is a block diagram for processing the seafood byproducts.

DESCRIPTION OF THE REFERENCED NUMERALS

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, the figures illustrate the Apparatus and System for Cooking, Drying and Peeling Shellfish Products of the present invention. With regard to the reference numerals used, the following numbering is used throughout the various drawing figures.

- 10 Shellfish Processing System
- 12 refrigerated loading dock
- 14 conk tank
- 16 jetted water
- 18 product
- 20 conveyor of 14
- 21 boiler system
- 22 primary seafood boiler
- 24 brine
- 26 brine mixing tank
- 28 auxiliary tanks

30 dryer
32 air return system
34 broth processing system
36 peeler
38 product transfer system
40 broth
42 broth storage tank
44 broth packaging
46 raw product testing
48 packaging room
50 loading dock conveyor
52 crate
54 ice
56 dumping cage conveyor
58 dumping cage
60 paddle wheel
62 ice guard
64 hot air manifold
66 conduit

68 random test of raw product
70 foreign substance/chemical detection sensors
72 gross weight monitoring
74 salinity monitoring sensors
76 high speed fans
78 spreader bars
80 rakes
82 spray drying system
84 product tracking
86 rheostats
88 timers
90 aerated conveyor belt
92 seafood dryer conveyor
94 humidity/moisture sensors
96 conveyor sensors
98 timer of 50
100 sanitizing system
102 collection system
104 vacuum system

106 air flow controls

108 air contaminate sensors

110 video monitoring

112 hopper of 36

114 screen of 36

116 motor-power source of 36

118 tilting unit

120 stationary stand

121 legs of 120

122 loading device

124 unloading device

126 screen sweeper

128 blade

130 opening of 112

132 control panel of 118

134 jets of 124

135 conventional tumbler (peeling device)

136 enhanced peeling device

138 peeler hinged access port

- 139 conventional leading means
- 140 sensors
- 141 conventional dust collection system
- 142 conventional boiler with screen baskets
- 143 product lifting unit
- 144 conventional boiler with conveyor
- 146 conventional dryers
- 148 stacked conveyor dryer (manual load and unload)
- 150 enhanced stacked conveyor dryer
- 152 spiral conveyor dryer
- 154 enhanced spiral conveyor dryer

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The following discussion describes in detail one embodiment of the invention. This discussion should not be construed, however, as limiting the invention to those particular embodiments, practitioners skilled in the art will recognize numerous other embodiments as well. For definition of the complete scope of the invention, the reader is directed to appended claims.

FIGURE 1 is a schematic diagram of the present invention **10**. Raw product **18** is crated in ice and introduced to the present invention **10** at a refrigerated loading dock **12** where raw product testing **46** is randomly performed to check for contaminants prior to being transferred to a conk tank **14** that serves to separate heavier items such as conk shells that become trapped in the lower section thereof. Jetted water **16** is injected into the conk tank **14** to agitate the contents therein, thereby moving the product **18** to a conk tank conveyer **20** for transferal to a primary seafood boiler **22** filled with a brine **24** mix of salt and water that is prepared in brine mixing tanks **26** and stored in auxiliary boilers **28** to maintain the brine **24** at a specific temperature until ready for distribution to the primary seafood boiler **22**. Once the product **18** is fully

cooked, it is transferred to at least one dryer **30**, with all dryers **30** supplied with hot air by an air return system **32** that transfers residual heat from all related heat generating equipment such as the boilers **22,28**, the broth processing system **34** and the like. The product **18** is subsequently delivered to the peelers **36** for deshelling once adequately dried by means of a product transfer system **38** that initially vacuums the smaller product **18** from the dryers **30** and continues to separate the product **18** by size as the suction of the vacuum gradually increases, thereby enabling the transfer system **38** to lift increasingly larger product **18** to the peeler **36**. The transfer system **38** is filtered to remove harmful contaminants such as bisodium sulfate.

Used brine **24** is removed from the primary seafood boiler **22** and transported to a broth processing system **34** for the development of a seafood flavored broth **40** that is then stored in broth storage tanks **42** prior to broth packaging **44**.

FIGURE 2 is a diagrammatic view of the movement of the product **18** from the refrigerated loading dock **12** to the primary seafood boiler **22** of the present invention **10**. The product **18** is delivered to the loading dock conveyor **50** packed in crates **52** with ice **54** and transported to the inclined dumping cage

conveyor **56** and tumbles into the dumping cage **58** thereby allowing the ice **54** and product **18** to fall into the conk tank **14**. The dumping cage **58** then rejects the empty crate **52** and tosses it aside to allow the following crate **52** to drop therein. A plate-like vertical ice guard **62** traverses the width of the conk tank **14** and extends above and below the water surface to prevent the floating ice **54** from contacting the conk tank conveyor **20**. The product **18** travels along on the conk tank conveyor **20** and is then delivered into the primary seafood boiler **22** where it is cooked at a predetermined temperature for a specific amount of time. At least one agitation means, such as the paddle wheel **60** shown, is provided to stir the product **18** to allow for the uniform cooking thereof.

Figure 3 is a block diagram of the boiler system **21** demonstrating the fluid connections through conduit **66** from the brine mixing tank **26** to the auxiliary tanks **28** and the primary seafood boiler **22** and then to the broth processing system **34**.

Figure 4 is a block diagram depicting the heat exchange system of the present invention **10** wherein heat is scavenged from heat -generating machinery such as the auxiliary tanks **28**, the primary seafood boiler **22** and the broth

processing system **34** and transferred to the dryers **30** by means of a warm air manifold **64**. An air return system **32** returns the air from the dryers **30** and returns it to the heat generating machinery.

Figure 5 is a block diagram of the present invention **10** wherein the primary seafood boiler includes paddle wheels **60** and jetted water **16** to agitate the liquid and product **18** therein. Random product testing **68** is performed prior to introduction to the system and foreign substance/ chemical testing **70** is performed within the conk tank **14** to assure greater safety of the food product. Quality control in the cooking process includes a plurality of automated tests and overseer devices such as gross weight monitoring **72**, salinity monitoring sensors **74**, product tracking means **84**, timers **88**, rheostats **86** and the like. The shellfish product **18** is moved from the primary seafood boiler **22** via the primary seafood boiler conveyor **92** which has a mesh like belt to move the product **18** to the dryer **30** while letting air pass through. High speed fans **76** above the primary seafood conveyor **92** blow air over the food as it travels therealong to blow away the steam from the shellfish product **18** and cool it off to terminate the cooking process. A plurality of spreader bars **78** and rakes **80** serve to ensure that the seafood product **18** is evenly distributed over the

conveyor **92**. Heat is transferred from the primary seafood boiler **22** to the dryer **30** by a hot air manifold **64** and returned thereto for reheating by a hot air recovery & air circulation system **32**.

Figure 6 is a block diagram of the dryer **30** and its related components including conveyor sensors **96** for monitoring how much product **18** is being transferred from the boiler **22** to the dryer **30**. Thermostats and regulators **112** are provided for temperature control and humidity and moisture sensors **94** activate the conveyor rakes **80** to stir the product **18** during drying. Other such options to monitor and regulate the dryer **30** functions include video monitoring **110**, rheostats **86**, air contaminate sensors **108**, air flow controls **106**, and a timer **98** to determine product **18** rotation which activates conveyor causing product **18** to be dumped from the upper level of the chute to the lower level. Further options include a sanitizing system **100**, a collection system **102**, a built-in vacuum system **104**, and video monitoring **110**.

Figure 7 is a front view of the peeler **36** and additional options associated therewith. The stainless steel outer container **112** has an opening **130** at the top for manual unloading by dumping or vacuuming cleaned product **18**

therethrough. The opening **130** is also used for the auto-loading device **122**.

The spinning blade **128** may be fabricated of a wide variety of materials including stainless steel, aluminum, polymeric composites etc. The motor and power source **116** may be electrical, pneumatic or hydraulic. The screen **114** is constructed of a plain weave, single or double square screen or meshed material.

The unloading device is a sectional piece of the screen which opens and allows the screen sweeper **126** to sweep cleaned product into the opening **130** which jets air for extraction of product **18**. The hopper **112** may be mounted on a mobile tilting unit **118** with a control panel **132** for manual dumping or on a stationary stand **120** with legs **121** for use with air induced loading **122** and unloading **124** devices.

FIGURES 8A - 8C is a block diagram of the seafood processing system of the present invention comprised of delivery to the conk tank, cleaning the shrimp in a conk tank, boiling the shrimp, drying the shrimp and peeling the shrimp. Any one of these functions can be accomplished in whole or in part by the system of the present invention. Delivery of the shrimp to the conk tank **14** can be either manual or automated. In the automated method the shrimp is placed on either a conveyor belt **50** or product lifting unit **143** that either may have a

dumping cage **58** forming an integral part therewith. The conk tank **14** is used to clean the seafood product and remove any foreign matter therefrom which may include sensor(s) for determining chemical contaminants. The conk tank **14** may also include apparatus to enhance processing of the seafood, such as water jets **16**, raw product testing **46** dumping cage **58**, paddle wheel **60**, ice guard **62**, random testing of product **68**, and salinity monitoring sensor(s) **74**. Once the seafood product is cleaned, it is moved either manually or mechanically to a boiler. The boiler may be a conventional boiler with lift baskets **142** or conveyor **144** or the boiler system **22** of the present invention. Each of these may incorporate additional apparatus, such as auxiliary tanks **28** and/or hot air manifold **64** providing additional functions. In addition, other processes may extend from the boiling of the seafood product, such as processing the brine solution into a broth **34** or food flavoring **82**. Once boiled the seafood product is moved either manually or mechanically to a drying process. The drying process may include conventional dryer box with screened deck **146**, spiral conveyor dryer **152**, **154** or stacked conveyor dryer **148**, **150** with each of these devices having additional apparatus, such as air return system **32**, spreader bars **78**, rakes **80**, product tracking **84**, aerated conveyor belt **90**, conveyor sensors **96**, sanitizing system **100**, collection system **102**, vacuum system **104**, air flow

control **106**, air contaminate sensors **108** and video monitoring **110** for enhancing the functionality of the drying system. Once dried the product is transferred either manually or mechanically to a peeling process. The peeling process may include conventional tumbler peeler **135**, peeler **136**, and peeler **36** where each of these may include additional apparatus, such as loading device **122**, screen sweeper **126**, blade **128**, tilting unit **118**, stationary stand **120**, unloading device **124**, hopper **112** and screen access panel **138**.

FIGURE 9 shows a block diagram of an additional element of the present invention comprising a brine broth processing system **34** wherein brine **24** from the brine mixing tank **26**, auxiliary tanks **28** or salt is added to water and introduced into the aforementioned boilers and under predetermined conditions the broth **40** is moved to storage tank(s) **42** where it is packaged **48** as either a brine broth **34** or spray dried **82** and packaged **48** as a food additive.

FIGURES 10A and 10B is a block diagram showing another element of the present invention comprising a heat recovery system. The system recovers heat from the aforementioned boiler systems and broth system and recycles the heat to the aforementioned boiler systems and/or dryer systems **148**, **150**, **152**

and **154** and/or peeling devices **36, 136**.

FIGURE 11 is a block diagram showing another element of the present invention comprising processing of the byproduct shells and heads of the seafood process. As previously stated the seafood passes from the conk tank **14** to the boiler system **21** to the dryer **30** and peeler **36**. The byproduct shells and heads are transferred to a product transfer system **38** and packaged for resale.

It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

While certain novel features of this invention have been shown and described and are pointed out in the annexed claims, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

CLAIMS

What is claimed is new and desired to be protected by letters patent is set forth in the appended claims:

1. Apparatus and system for cooking, drying and peeling shellfish products comprising:
 - a) a fluid filled conk tank for separating the shellfish product from packing ice, sea shells and other such large objects; and
 - b) an automated means for transporting the crated product to said conk tank, dumping the shellfish product into said conk tank from the crate and removing the crate therefrom.

2. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, further comprising:
 - a) a boiler system for supplying heated brine and cooking the shellfish product therein; and
 - b) an automated means for transferring the shellfish product from said conk tank to said boiler system.

3. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, further comprising:

- a) at least one dryer for dehydrating the shellfish product; and
- b) an automated means for transferring the shellfish product from said boiler system to said dryer.

4. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, further comprising:

- a) at least one peeling device for removing the heads, shells and tails from the shellfish product; and
- b) an automated means for transferring the dried shellfish product from said dryer into said peeling device and for removing it therefrom;

5. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, further comprising an automated means of separating shells and debris from finished product.

6. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, further comprising an automated means of

grading product by size.

7. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, further comprising an automated means of packaging shells and dust.

8. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, wherein said automated means for transporting the crated product to said conk tank comprises:

- a) a conk tank conveyor system having a first loading end and a second dumping end, said dumping end extending above and beyond the edge of said conk tank;
- b) a dumping cage disposed proximal to said dumping end of said conveyor system positioned in a manner conducive to catching said crate after it falls off said dumping end so the open top portion of the crate is oriented towards said conk tank thereby emptying the contents of said crate therein, said dumping cage being substantially open so as not to restrict passage therethrough of said shellfish product; and
- c) a mechanical means for ejecting said crate from said dumping cage.

9. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, wherein said conk tank comprises:

- a) a watertight housing having sidewalls and an open top;
- b) a substantial quantity of water retained within said housing; and
- c) means for agitating said water and lighter objects within said conk tank.

10. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 2, wherein said boiler system comprises:

- a) a brine mixing tank including a means for introducing water therein and a means for introducing salt therein to create a brine solution of a predetermined concentration in which the shellfish product is to be cooked;
- b) a primary seafood boiler to retain brine obtained from said brine mixing tank and maintain said brine at a constant, predetermined temperature; and
- c) conduit communicating between said brine mixing tank and said primary seafood boiler for the selective transport of brine to the primary mixing tank.

11. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 10, wherein said boiler system further comprises one or more auxiliary boilers in line with said conduit for heating said brine to the desired temperature and storing it therein until called for to replenish used brine that has been removed from said primary seafood boiler

12. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, wherein said means for transferring the shellfish product from said conk tank to said boiler system is a substantially inclined conk tank conveyor having a first lower end located at a bottom portion of said conk tank positioned below said dumping cage, and a second, upper end extending above and beyond the opposing sidewall of said conk tank housing so as to extend over said primary seafood boiler thereby permitting the shellfish product to fall therein upon reaching the end of said conk tank conveyor.

13. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 10, wherein said primary seafood boiler further includes a means for agitating the brine and contents therein.

14. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 13, wherein said agitation means includes at least one paddle wheel at the surface of the brine to keep the shellfish product moving evenly therethrough.

15. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 13, wherein said agitation means includes at least one jet nozzle for circulating the brine and product within the boiler.

16. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 10, wherein said primary seafood boiler further includes means for selectively maintaining and monitoring a specific temperature of said brine therein.

17. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 10, wherein said primary seafood boiler further includes salinity monitoring sensors to assure that the seafood is being cooked in an adequate brine mix.

18. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, wherein said means for transporting said shellfish product from the said boiler system to said dryer is a seafood dryer conveyor having a first lower end disposed at a bottom portion of said primary seafood boiler beneath the drop area of the conk tank conveyor and a second end extending over and beyond the opposing sidewall where it assumes a substantially horizontal orientation and terminates upon introduction to said dryer.

19. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 18, wherein said seafood dryer conveyor further includes a plurality of high speed fans blowing over said conveyor for cooling the shellfish product and stopping the cooking process.

20. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 18, wherein said seafood dryer conveyor further includes a plurality of spreader bars traversing the width of said conveyor and disposed slightly thereabove at a height sufficient to permit individual pieces of

shellfish to pass thereunder but will prevent passage of stacked shellfish until it is residing on said conveyor rather on top of another shellfish thereby assuring the shellfish product is evenly spread thereon for more efficient cooling.

21. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 18, wherein said seafood dryer conveyor further includes a plurality of rakes for turning said shellfish product to further ensure the uniform cooling thereof.

22. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 18, wherein said seafood dryer conveyor is enclosed to prevent exposure to airborne contaminants.

23. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 18, further including a transport portion of said seafood dryer conveyor that is composed of a mesh-like belting to permit the passage of air therethrough.

24. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, further comprising a means for supplying heat to the dryers by capturing the heat generated by said boiling and broth systems and transferring it thereto.

25. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 24, wherein dryer heat supply means includes a manifold integral with said boiler system and in communication with the dryers to scavenge the heat from the heat generating boilers and transfer it thereto.

26. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 24, wherein said dryer heat supply further includes an air return system to return air to said boiler system from said dryers using fans or blowers to maintain constant air flow and recirculation.

27. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, wherein said dryers include a means for moving and rotating said shellfish product within said dryers during the drying process.

28. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 27, wherein said product moving and rotating means is a vertically stacked conveyor system having a plurality of staggered, parallel conveyors spaced apart one above the other and moving in alternating directions, the shellfish product is introduced into the dryer on the top conveyor and falls off upon reaching the end thereof and lands on the subjacent conveyor thereby effectively rotating said shellfish product which then travels in the opposite direction until falling onto the conveyor subjacent thereto and the process continues as such until reaching the bottom conveyor that transports the shellfish product to another dryer or peeling device.

29. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 27, wherein said product moving and rotating means is a vertically stacked conveyor system having a plurality of staggered, parallel conveyors spaced apart one above the other and moving in alternating directions, the shellfish product is introduced into the dryer on the top conveyor and falls off upon reaching the end thereof and lands on the subjacent conveyor thereby effectively rotating said shellfish product which then travels in the opposite direction until falling onto the conveyor subjacent thereto and the process

continues as such until reaching the bottom conveyor that transports the shellfish product to said peeling device.

30. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 27, wherein said product moving and rotating device comprises a spiral platform having a substantially cylindrical chute extending medially therethrough wherein the orbital motion of the spiral platform spirals the shellfish product upwards until reaching the top where it enters said chute and falls to the bottom thereby rotating said product which is subsequently reloaded onto said spiral platform as the cycle repeats.

31. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, wherein said dryers further include vacuum bars running along the bottom portion of said dryer to vacuum accumulated shells and shellfish product that may have fallen off the conveyors.

32. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, wherein said dryers further include sensors to detect the moisture content within said shellfish product to ensure complete

dehydration with no pathogen traces.

33. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, further comprising a product transfer system which utilizes suction to vacuum said shellfish product from one device to another.

34. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 33, wherein said product transfer system is utilized to move said shellfish product from said spiral dryer to said peeler.

35. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 4, wherein said peeling device comprises:

- a) an inner compartment having a screened bottom;
- b) an outer compartment; and
- c) a blade member that spins within said inner compartment so that the cleaned shellfish product rides along the smooth walls of said inner compartment while the heavier uncleaned shellfish product falls onto said screened bottom to continue cleaning of de-shelling

process.

- d) separation of debris and shells from finished product by vacuum extraction and loading by-product into packages or drums;
- e) working in sequence with the dryer and product transfer system to grade product by size if so desired;
- f) optional auto-unload of finished product;
- g) an optional mobile tilting unit;
- h) an optional stationary stand;
- i) an optional screen sweeper; and
- j) optional air jets.

36. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 2, further comprising a broth processing system wherein used brine is extracted from said primary seafood boiler and transported to said broth processing system for preparation into a seafood flavored broth.

37. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 36, further comprising broth storage tanks for the storage of the finished broth product.

38. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 36, further comprising a broth packaging system to package said broth for the market.

39. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 2, further comprising a spray drying system wherein used brine is extracted from said primary seafood boiler and injected as a fine mist into a heated furnace where instantaneous crystallization occurs creating a solid product to be used as a seafood flavored salt.

40. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, wherein said dryers further comprise conveyor rakes to stir said shellfish product during drying.

41. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 40, wherein moisture sensors activate said conveyor rakes.

42. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 41, wherein said dryers further include temperature control means.

43. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 42, wherein said temperature control means comprises:

- a) thermostats; and
- b) regulators.

44. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, wherein said dryers further include air contaminate sensors for detecting potential contaminants and toxins within said dryer.

45. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 44, wherein an alarm and notification means is in communication with said air contaminate sensors to notify the operator of a potentially hazardous condition.

46. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, wherein said dryers include video monitoring means to allow the operator to observe the operation within the dryers.

47. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 3, wherein said dryers further include rheostats.

48. Apparatus and system for cooking, drying and peeling shellfish products as recited in claim 1, further comprising a computerized monitoring system and central data base to oversee all operational phases of the present invention that may include:

- a) video and audio monitoring;
- b) chemical detection;
- c) product tracking;
- d) production schedules;
- e) gross weights of product;
- f) yields of product;
- g) critical control points;
- h) product water activity;

- i) moisture content sensors;
- j) heat sensors for air and water;
- k) heat, water and air flow control system;
- l) salinity monitoring;
- m) boiling/drying/peeling timers and controls;
- n) HACCP guidelines and regulations;
- o) FDA (Dept> of Health) inspection and production forms;
- p) quality control;
- q) system and process troubleshooting;
- r) tips for GMP's;
- s) raw product testing;
- t) alarms and notification;
- u) product (size) grading;
- v) thermostats;
- w) regulators;
- x) LED control panel; and
- y) rheostats.

49. A dumping cage for discharging crated seafood product into a conk tank comprising:

- a) means for receiving said crated seafood product;
- b) means for displacing the crate whereby the crate is up-ended to discharge the contents; and
- means for removing the crate from the receiving means.

50. A product delivery apparatus for conveying crated seafood product to a conk tank comprising:

- a) means for receiving said crated seafood product; and
- b) means for elevating said crated seafood product to the upper rim of a conk tank.

51. A system for delivering raw crated seafood product and discharging said product into a conk tank comprising:

- a) a product delivery apparatus; and
- b) a dumping cage for discharging said crated seafood into a conk tank.

52. a conk tank incorporating at least one of;

- a) means for circulating water under pressure;
- b) means for testing the raw seafood product;
- c) means for agitating the contents of said tank;
- d) means to prevent passage of ice while transferring raw seafood product therefrom; and
- e) sensors means incorporated therein for detecting foreign substances and chemicals within said tank.

53. means for processing raw seafood product comprising:

- a) means for delivering raw seafood product to a heated receptacle having a brine solution therein;
- b) means for heating said apparatus; and
- c) means for recovering heat from said apparatus.

54. The process as recited in Claim 53 wherein said delivery of said raw seafood product is taken from the list of lift basket and conveyor belt.

55. The process as recited in Claim 54 wherein said lift basket is comprised of:

- a) means for supporting a receptacle having raw seafood product therein;
- b) means for conveying said receptacle to the product input aperture of said boiler; and
- c) means for discharging the raw seafood product from said receptacle into said boiler.

56. The process as recited in Claim 54 wherein said conveyor belt is comprised of:

- a) a continuous belt extending between two distal ends having motorized means for rotating said belt between said distal ends; and
- b) one distal end of said conveyor belt terminates at the input aperture for said boiler.

57. The process as recited in Claim 53 further comprising a brine mixing tank in communication with said heated receptacle.

58. The process as recited in Claim 53 further comprising auxiliary tanks for holding a brine solution in communication with said heated receptacle.

59. The process as recited in Claim 53, further comprising means for drying the processed seafood from said heated receptacle.

60. The process as recited in Claim 59, incorporating means for recirculating heat from the drying to the boiling process.

61. The process as recited in Claim 53, wherein the brine solution is transferred under predetermined conditions to a broth processing system.

62. The process as recited in Claim 61, wherein the broth processing system is comprised of:

- a) storing the broth in tanks; and
- b) packaging the broth.

63. The process as recited in Claim 53 further comprising sealed conduit in communication with said heated receptacle whereby air passing through said conduit is heated.

64. The process as recited in Claim 53 further comprising a spray drying system wherein brine is extracted from the heated receptacle and injected into a heated furnace or hopper as a fine mist where it is almost immediately dehydrated thereby creating a solid product to be used as a seafood flavored salt or additive.

65. A broth processing system wherein the brine solution from a seafood boiler is transported to holding tanks prior to packaging as a brine broth.

66. A food flavoring byproduct system wherein the brine solution from a seafood boiler is extracted from the heated receptacle and injected into a heated furnace or hopper as a fine mist where it is almost immediately dehydrated thereby creating a solid product to be used as a seafood flavored salt or additive.

67. A peeling device in communication with a dryer, wherein said peeling device is comprised of:

- a) a loading device
- b) a screen sweeper
- c) a blade; and
- d) a tilting unit

68. A peeling device in communication with a dryer, wherein said peeling device is comprised of:

- a) a stationary stand;
- b) an unloading device;
- c) a blade; and
- d) a screened aperture providing access.

69. A spiral conveyor dryer in communication with a peeling device, wherein said spiral dryer cycles the product from a low end to a high end as heated air is passed over said product before dropping said product to the low end.

70. A stacked conveyor dryer in communication with a peeling device, wherein said stacked conveyor drier moves the product from one level to another as heated air is passed over said product.

ABSTRACT OF THE DISCLOSURE

A fully automated apparatus and system for processing shellfish such as shrimp and crawfish including the cooking, drying and peeling thereof. The present invention utilizes excessive heat generated by boilers and the like to heat the dryers. The product is cooked in a brine mix that once used is transferred to a broth processing system to make a seafood flavored broth and is also injected as a fine mist into a furnace where it crystallizes into a solid product to be used as a seafood flavored salt.

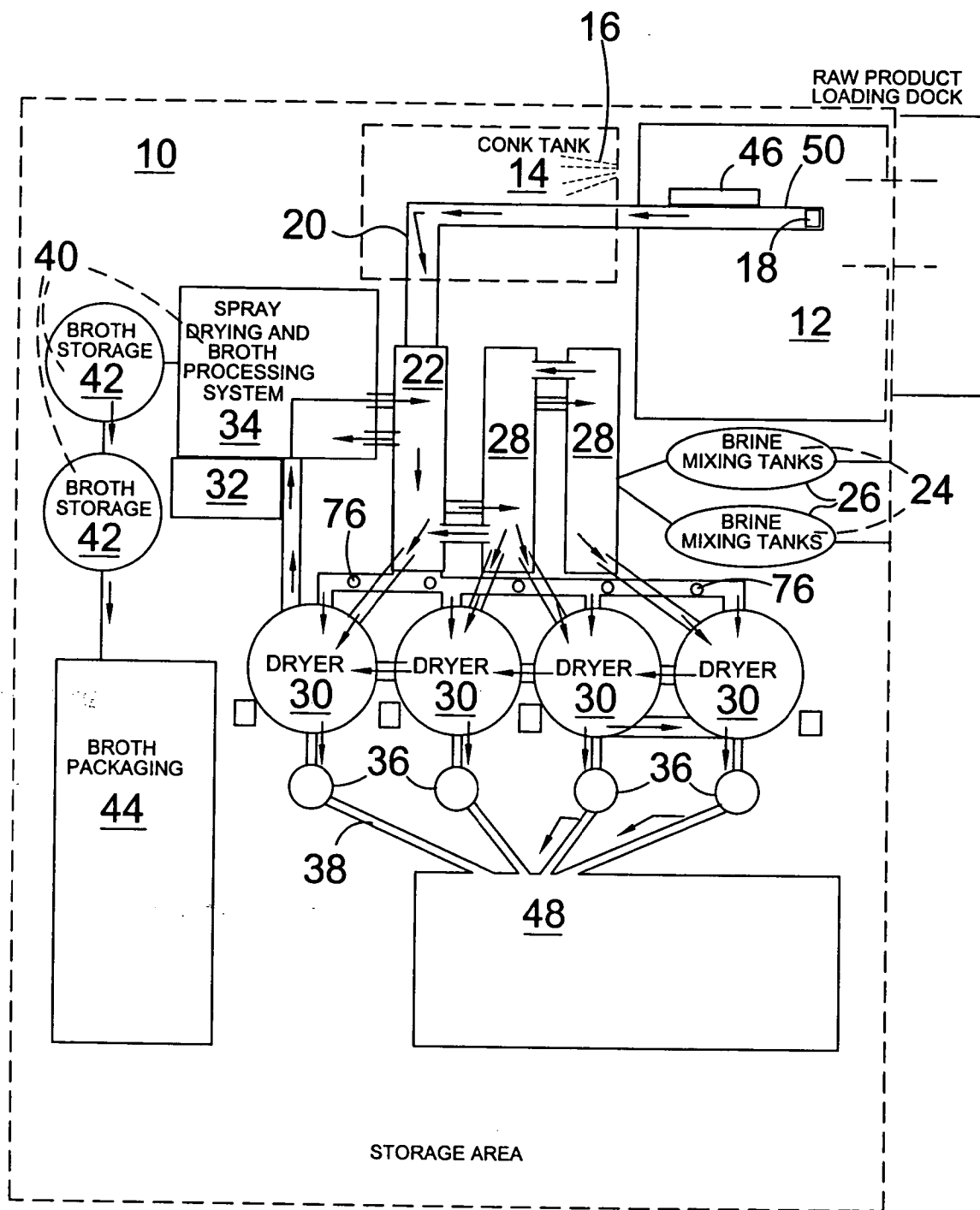


FIG. 1

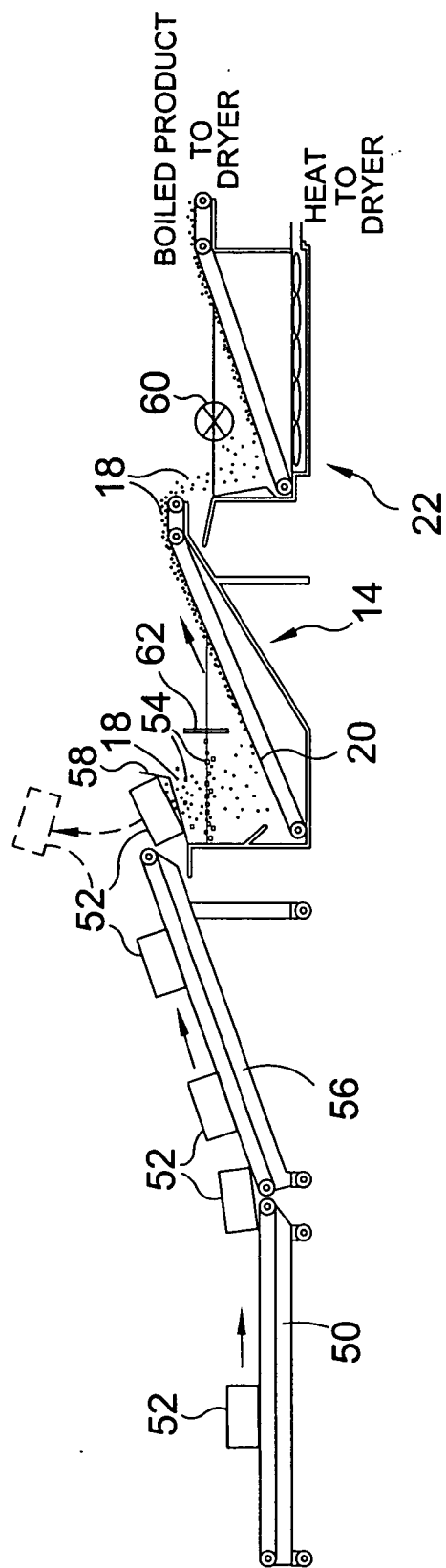


FIG. 2

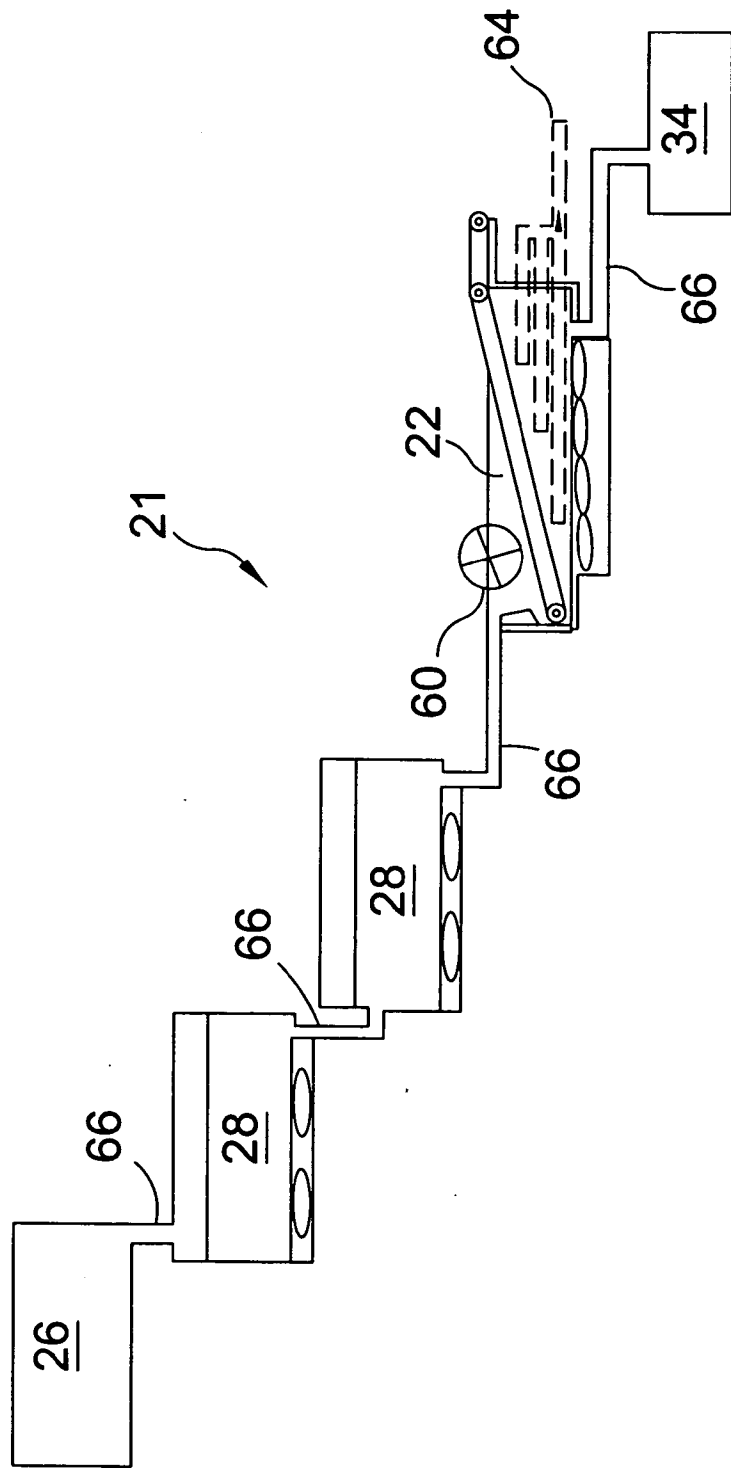


FIG. 3

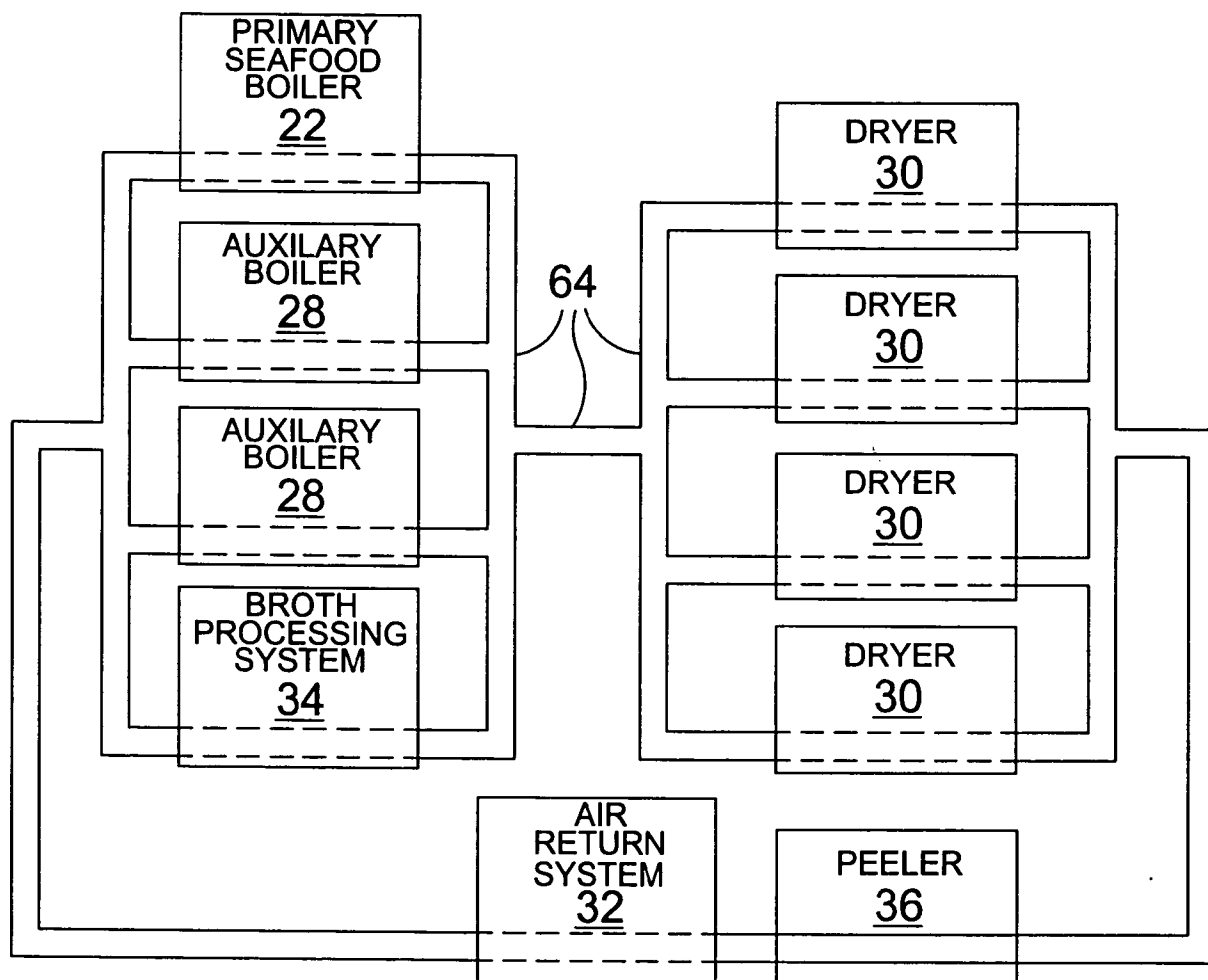


FIG. 4

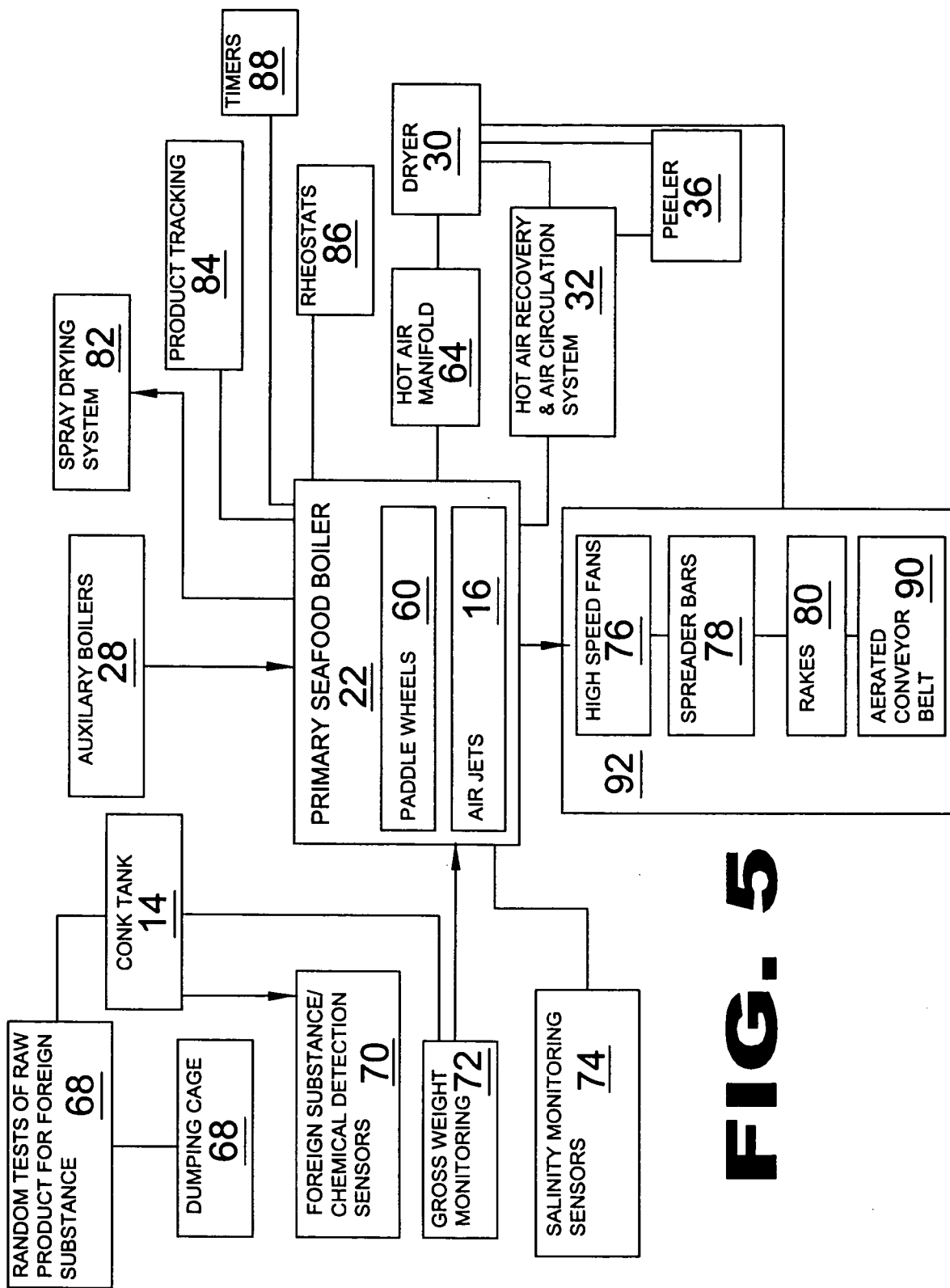


FIG. 5

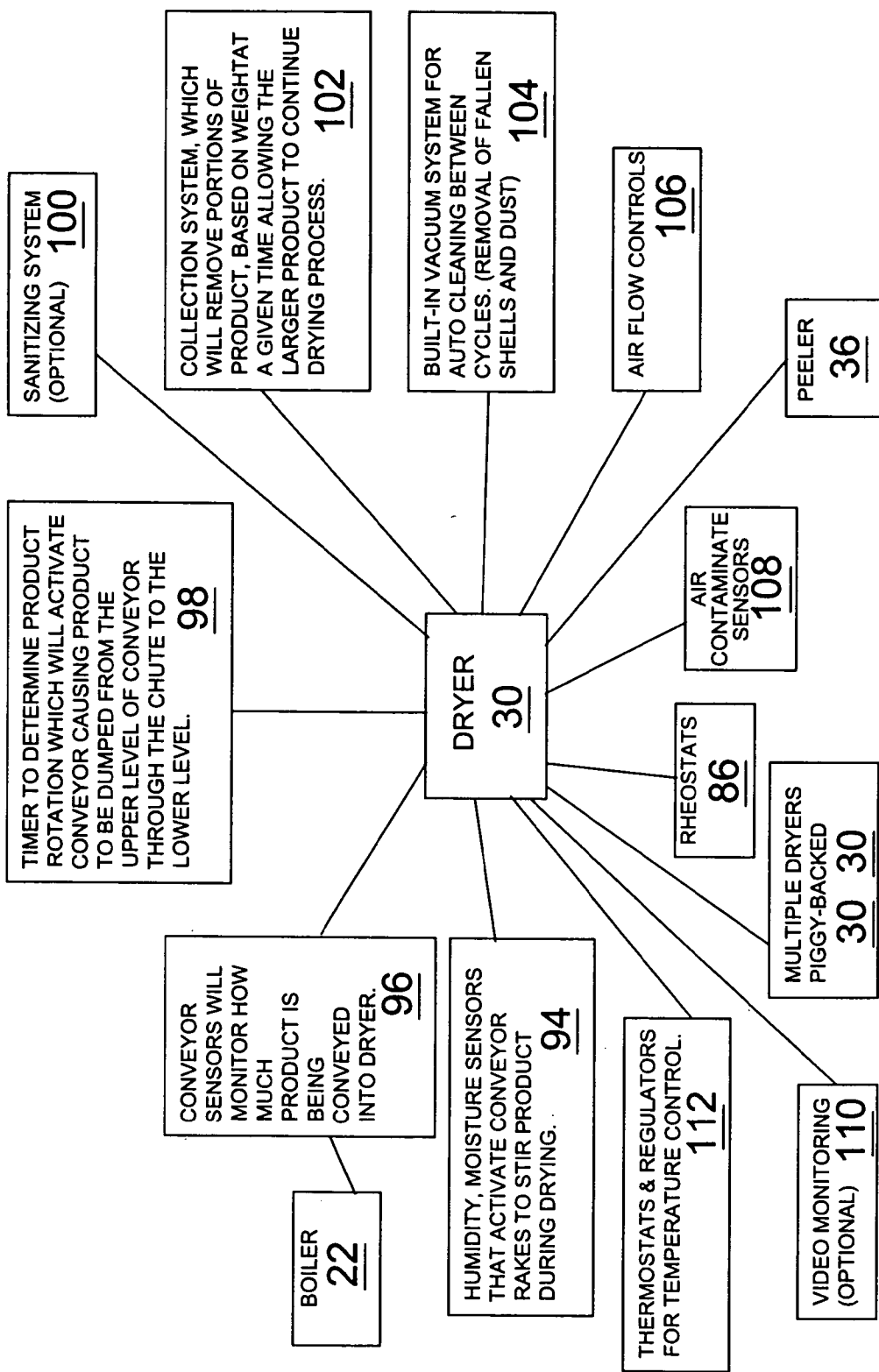


FIG. 6

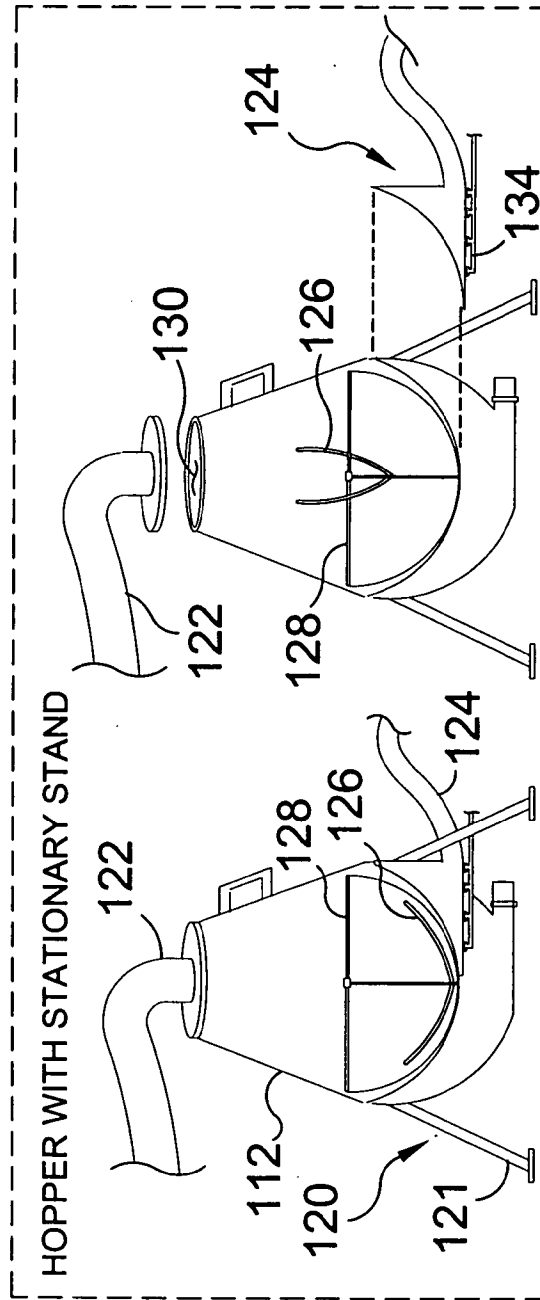
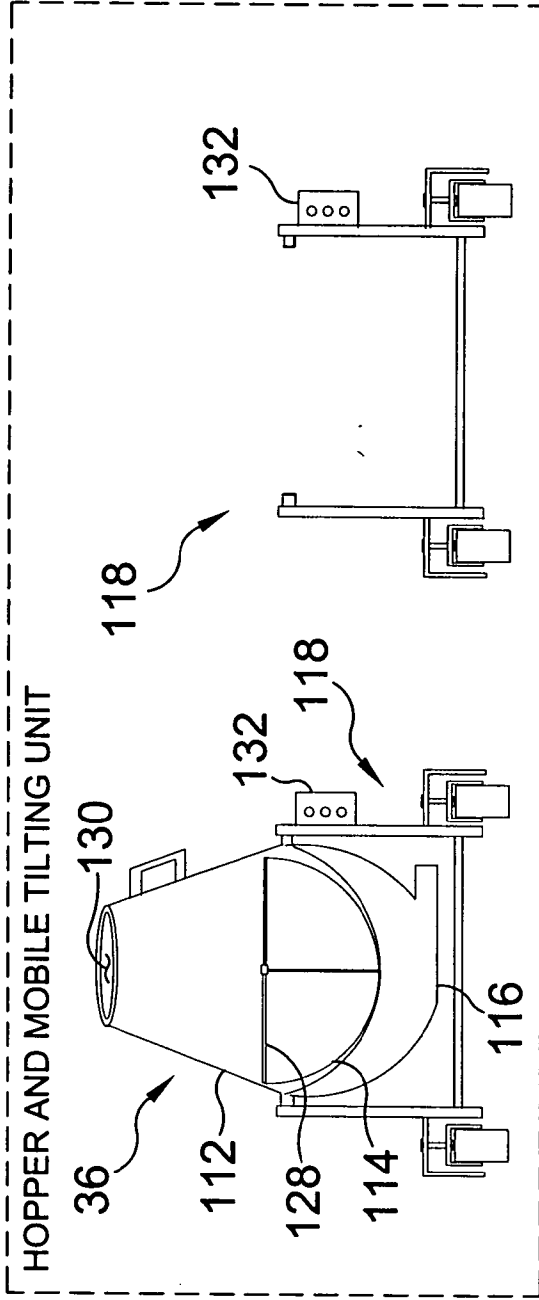


FIG. 7

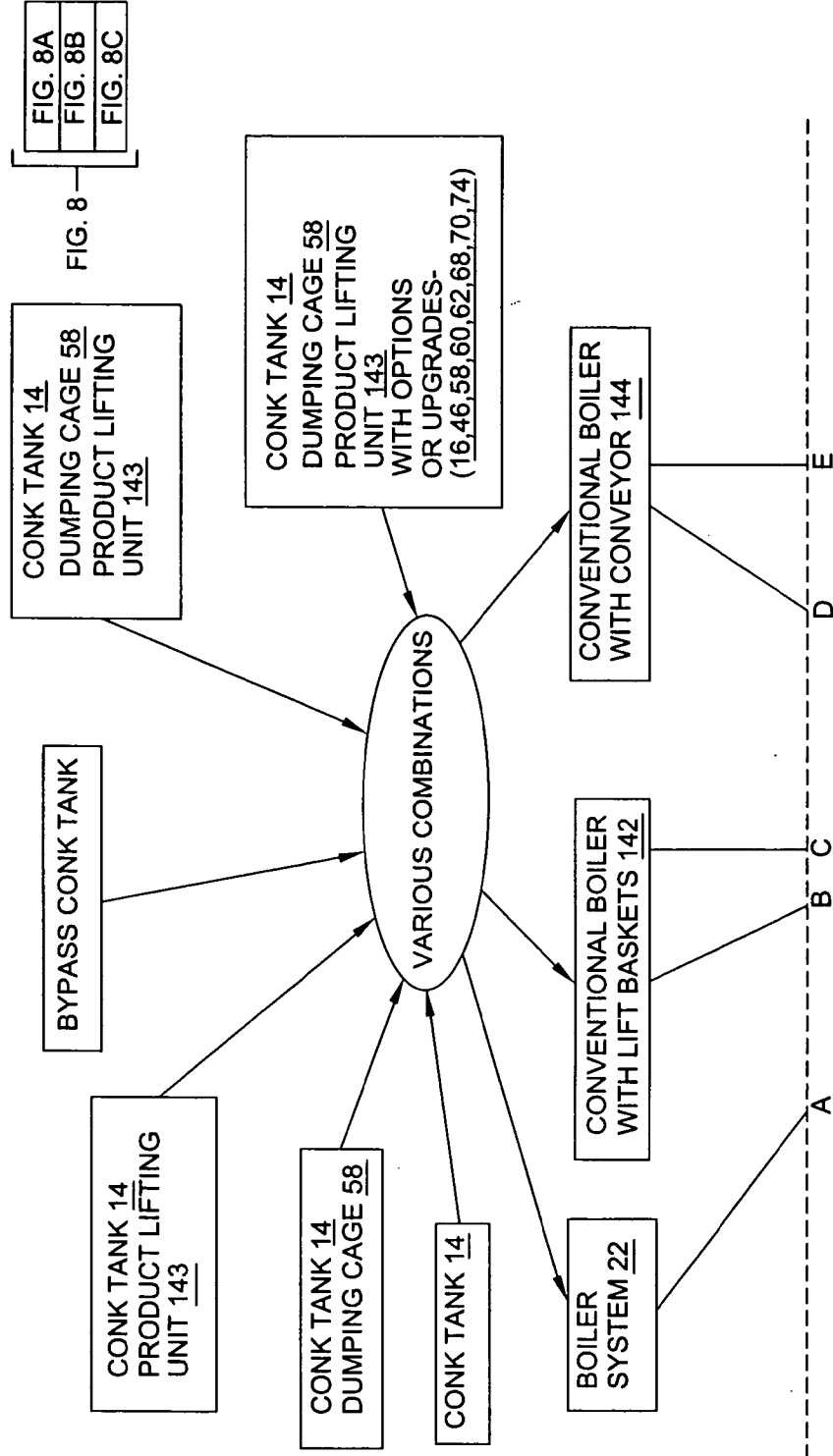


FIG. 8A

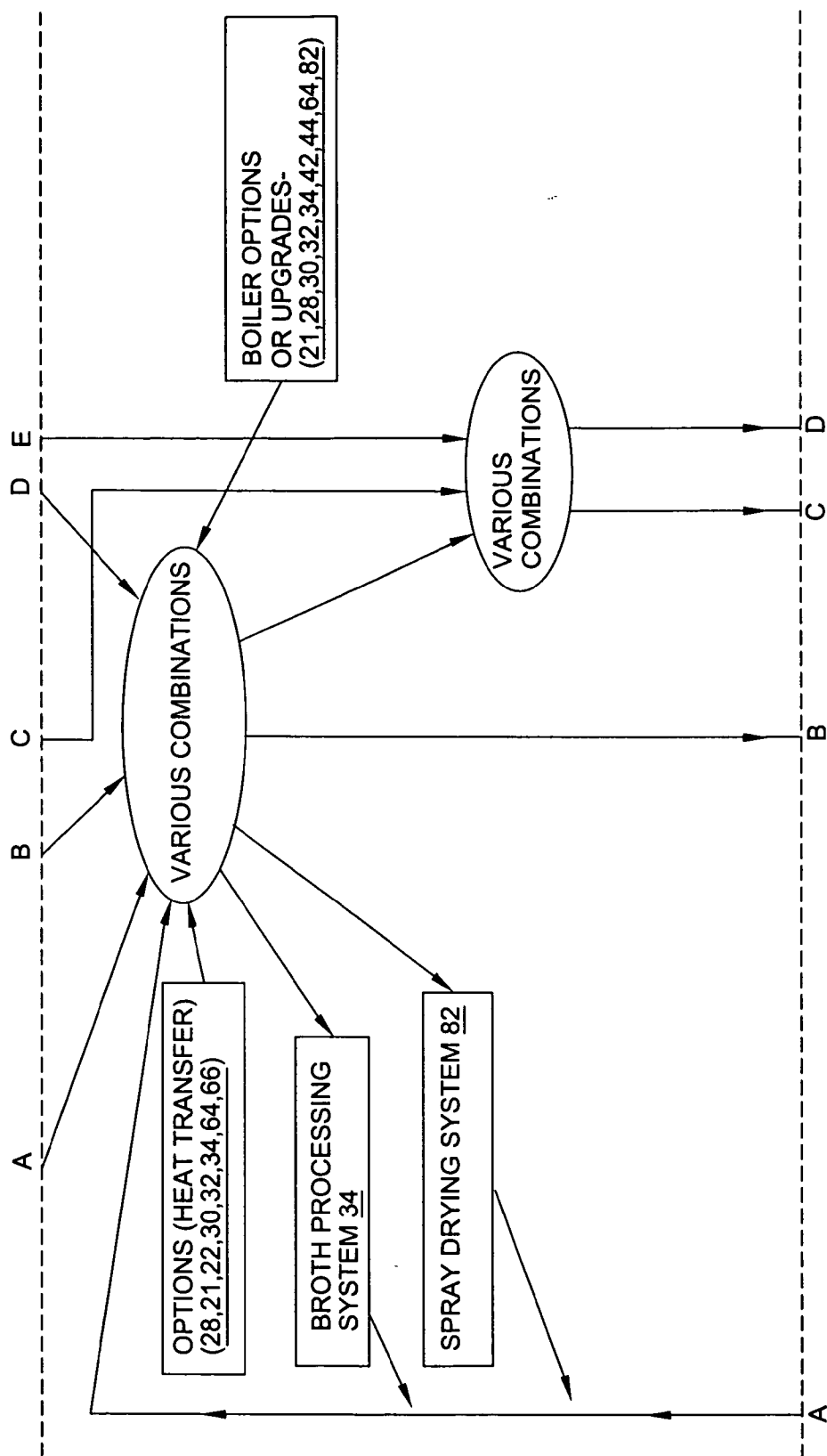


FIG. 8B

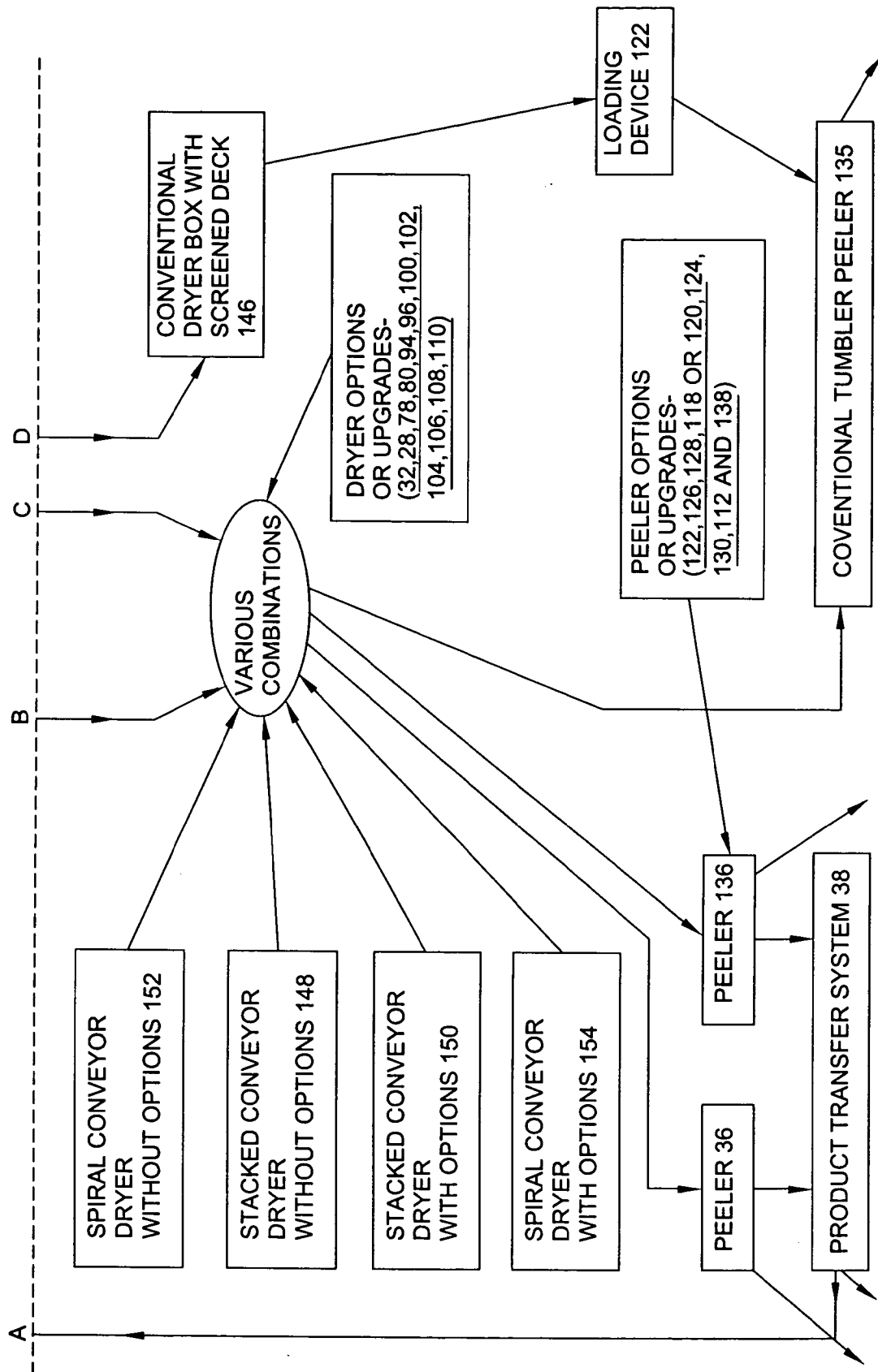


FIG. 8C

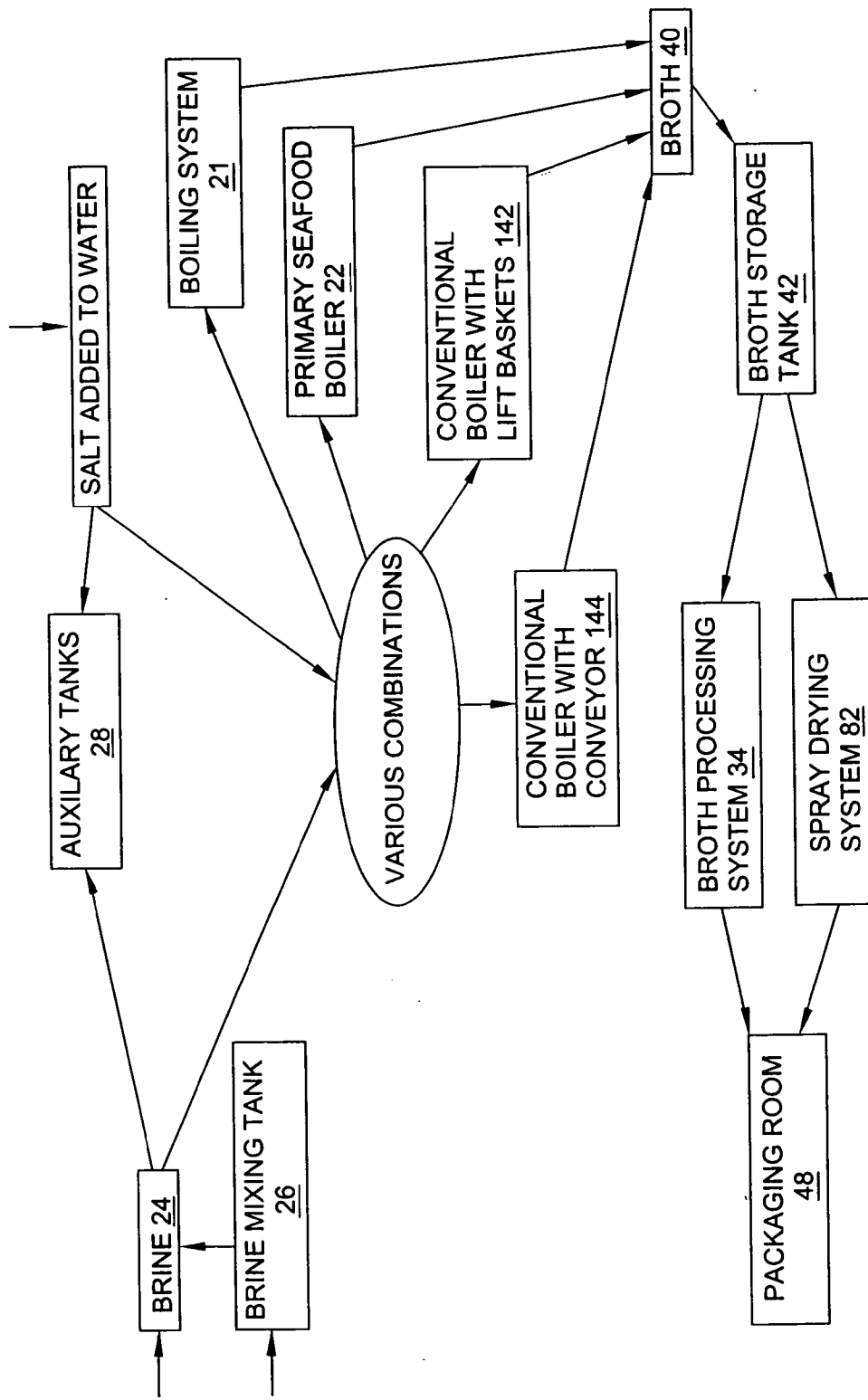


FIG. 9

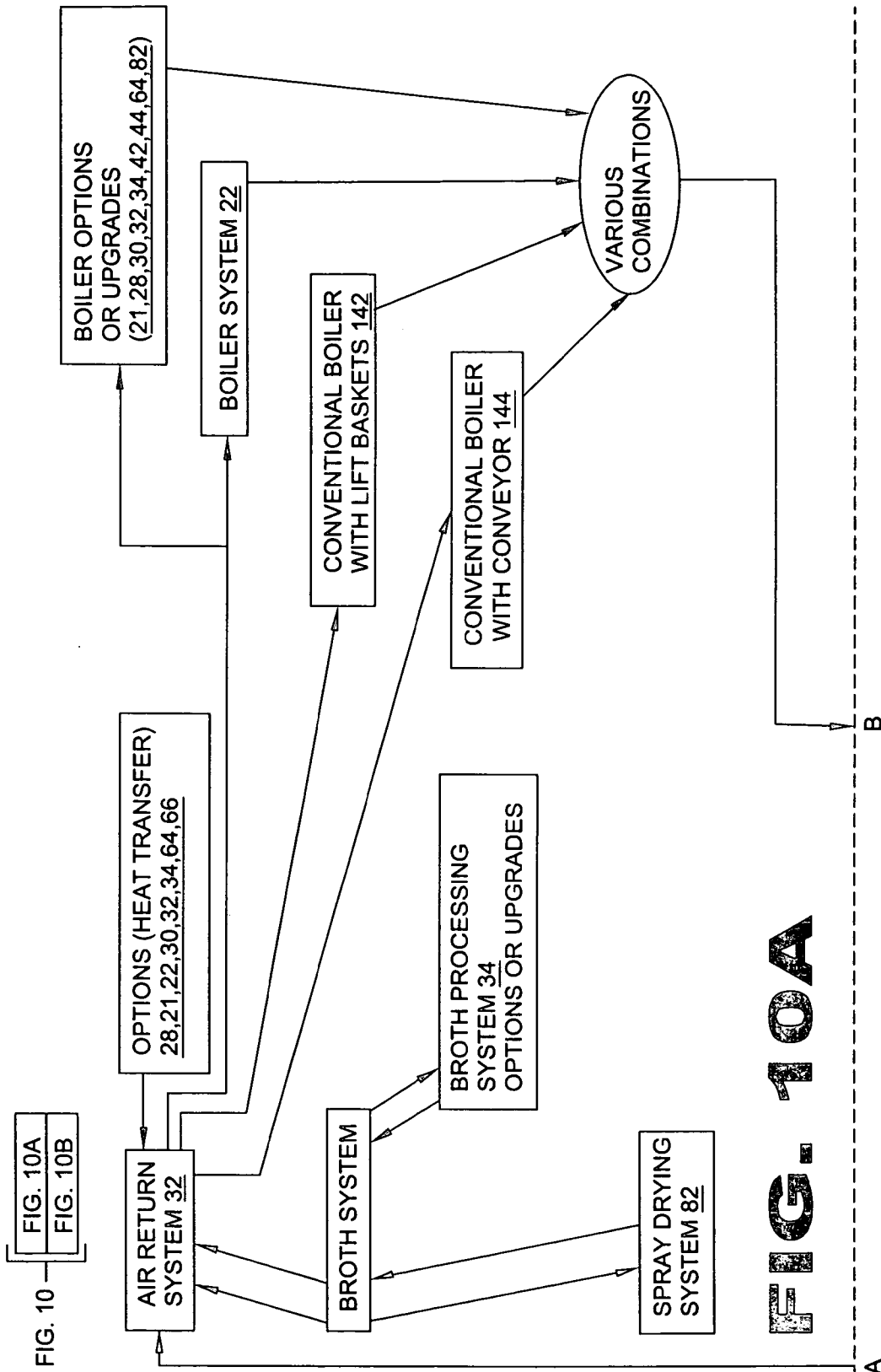


FIG. 10A

FIG. 10 —
 FIG. 10A
 FIG. 10B

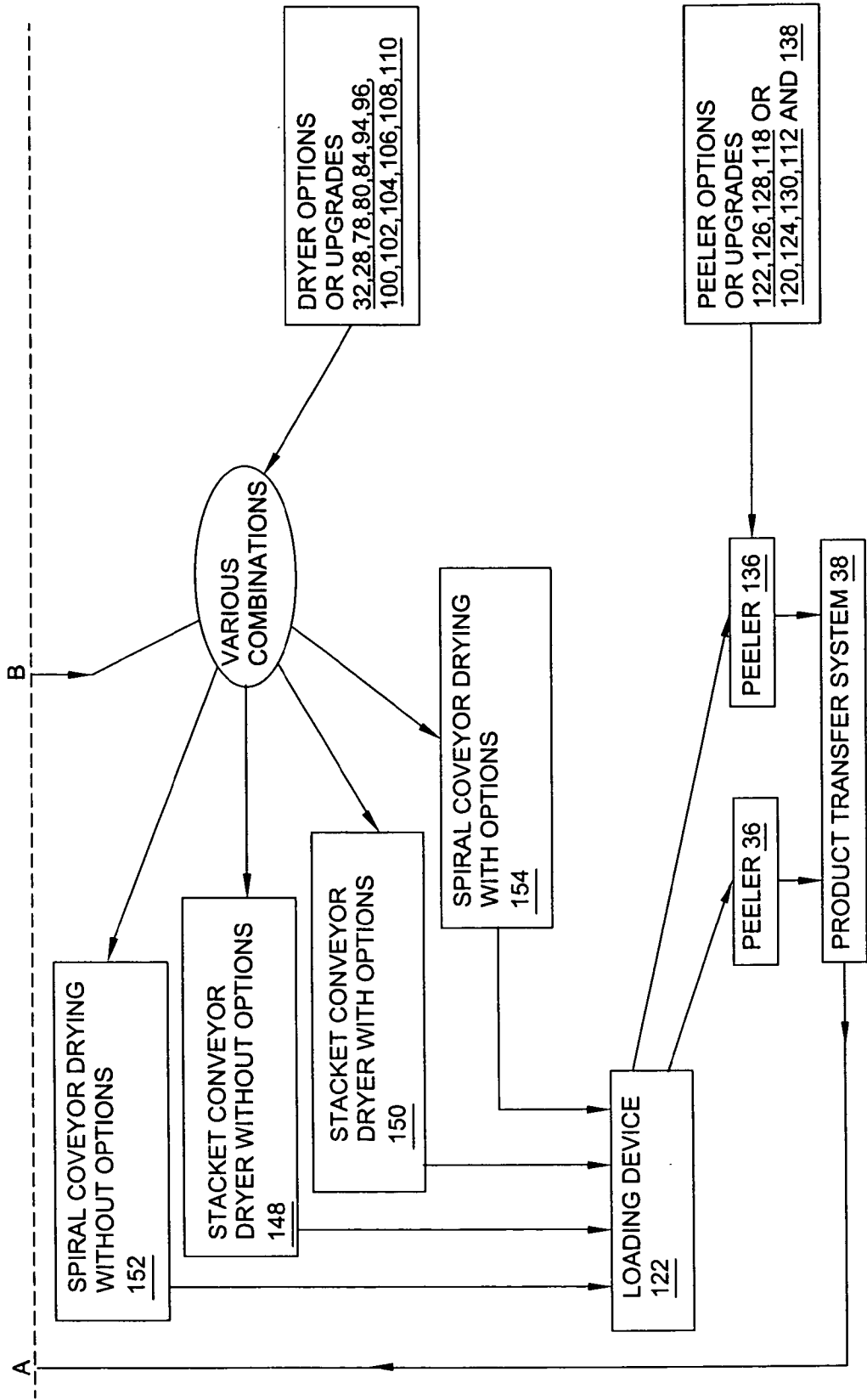


FIG. 10B

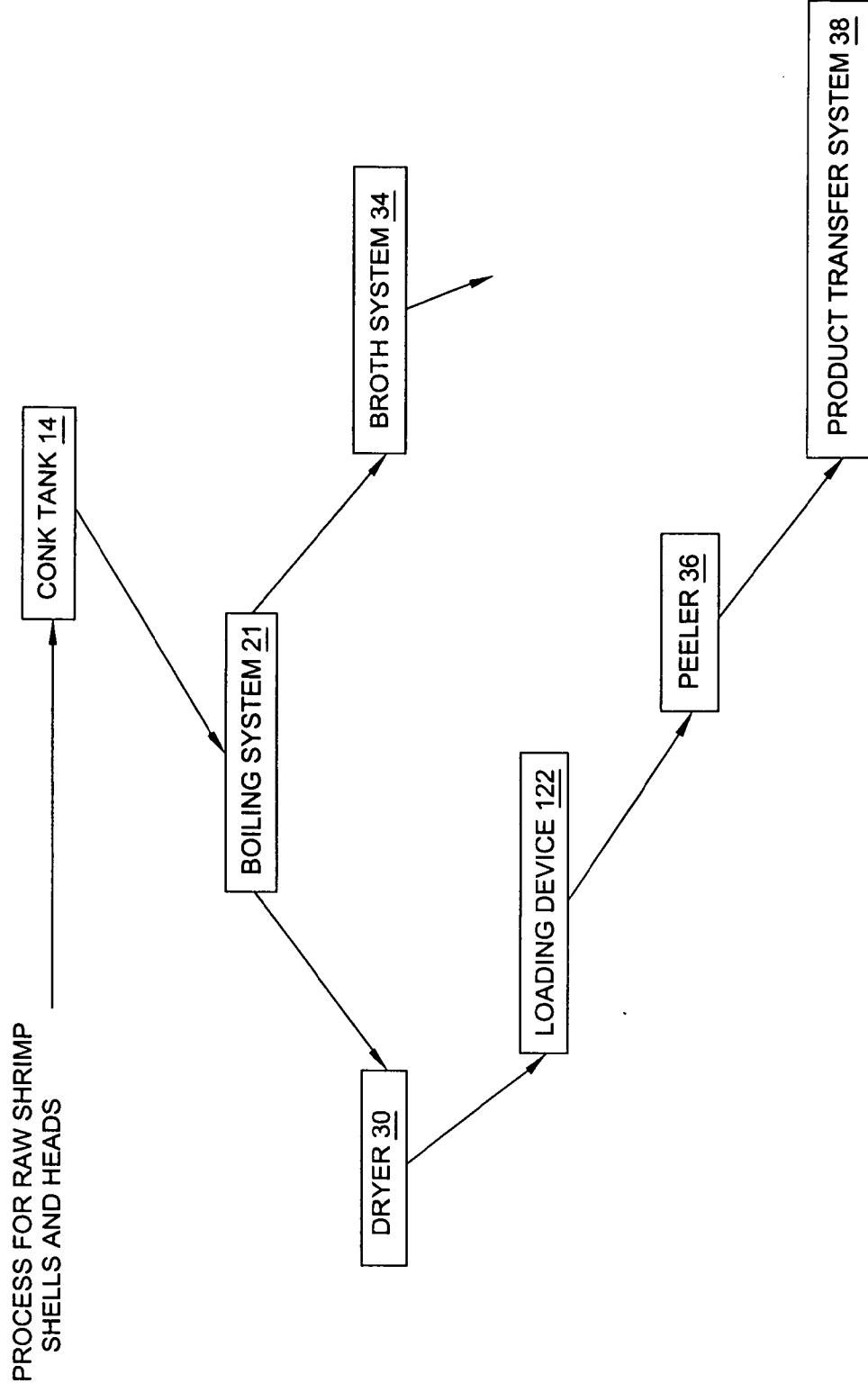


FIG. 11

DECLARATION AND POWER OF ATTORNEY
attorney docket number: MH-2-am-mv

As a below named inventor, I declare that:

My residence, post office address and citizenship are as stated next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**AUTOMATED APPARATUS AND SYSTEM FOR COOKING, DRYING
AND PEELING SHELLFISH PRODUCTS**

the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

POWER OF ATTORNEY: As a named inventor I hereby appoint the following attorney to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

Michael I. Kroll, Registration number: 26,755

SEND CORRESPONDENCE TO:

**Michael I. Kroll, telephone no. 516-367-7777
171 Stillwell Lane, Syosset, New York 11791**

Inventor's name: Last: **Hulin** First: **Michael** Middle: **J**
Residence(city): **Cypremort Point** State: **Louisiana** Citizenship: **USA**
P O address: **3501 Highway 319;** **Cypremort Point, Louisiana 70538**

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful statements may jeopardize the validity of the application or any patent issuing thereon.

Signature of Inventor: *Michael J. Hulin*

Date: 2/4/04

Applicant and Inventor: **Michael J. Hulin**

Serial or Patent No.: filed herewith

Filed or Issued: filed herewith

Title: **AUTOMATED APPARATUS AND SYSTEM FOR COOKING,
DRYING AND PEELING SHELLFISH PRODUCTS**

Attorney docket number: MH-2-am-mv

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office with regard to the invention described in the specification filed herewith as listed above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9 (e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed herein: (x) no such person, concern or organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Filed by: **Michael I. Kroll**, attorney for applicant;
Registration # 26,755; 171 Stillwell Lane;
Syosset, New York 11791; tele # 516-367-7777

Signature of Inventor: *Michael J. Hulin*

Date: 2/4/04